THE POWER OF FORESIGHT

NTULink speaks to Professor Ling San, Dean of NTU's College of Science, on the College's initiatives and future plans.

In 1985, when Professor Ling San chose the University of California at Berkeley over Cambridge for his PhD in Mathematics, his Singaporean friends were stunned.

Fast-forward almost three decades later, the doctoral programme in mathematics at Berkeley is ranked as one of the top in the world, and the foresighted Professor – now Dean of NTU's College of Science (CoS) – has brought his steadfast belief in doing things independently to propel NTU forward as a world-class university.

He first took reins of CoS in 2011 when it was still a young college. Firmly committed to investing in the future, he and his faculty had clear plans.

Says Prof Ling: "We had a very strong vision in crafting a curriculum that has its own unique features, some of which were very bold, I would say."

Back in 2005, when it was rare to have programming as a compulsory subject in a mathematical sciences curriculum, Prof Ling initiated making it a compulsory component. Again, in 2012, the CoS was questioned by stakeholders for launching a new specialisation called business analytics.

However, a decade on, programming modules and terms in business analytics have become common. In 2013, Deputy Prime Minister Tharman Shanmugaratnam articulated in his budget speech that Singapore is in dire need for business analytic specialists and cited NTU's programme that could train the manpower Singapore needed.

"There was tremendous boldness in terms of innovation, testing out ideas, treading into uncharted territories;

Professor Ling San, Dean of NTU's College of Science.

and related to that, a strong pioneering spirit," shares Prof Ling.

CoS comprises two schools – the School of Biological Sciences (SBS), which is about thirteen years old, and the School of Physical and Mathematical Sciences (SPMS), which is just about to finish its ninth year. The Dean has identified two areas to work on, mainly, research and education.

RESEARCH

Prof Ling San has high hopes for CoS - he wants the College to carve out a scientific niche and create a reputation in the community.

"So that's where I would like to see the College, where internationally it is immediately associated with certain discoveries and certain names," he says.

To Prof Ling San, the key to excellence in research is investment in the future. He understands the importance of talent and has no qualms about recruiting the people with the greatest scientific potential into his young faculty.

"It is not so easy for me to teach someone to become a great scientist…it's partly the innate ability or how his or her experience shapes up the person," explains Prof Ling.

In line with this goal, the faculty has worked hard to target the National Research Foundation fellowship winners; CoS now boasts almost half of all the winners in Singapore. About two-thirds of the recipients of NTU's Nanyang Assistant Professorship have also been brought in to the College.

EDUCATION

To attract good students, CoS has been constantly revamping its curriculum and facilities in order to improve the quality of education it offers.

"I would like them to choose us, or at least for us to become their choice because of certain unique features associated with our educational programmes or our approach to education," says Prof Ling.

As such, CoS has invested very heavily in infrastructure. According to Prof Ling, the teaching labs housed in SPMS, in the Division of Chemistry and Biological Chemistry are state-of-art and 'among the best in the world'.

Curriculum plays a part as well. The School has a strong track record of introducing novel modules that would play an integral part in the future. In addition, the curriculum for the experimental sciences (such as chemistry, physics and biology) has been designed to expose students to long hours in the lab, so that they can hone good hands-on skills and not just learn things in a vacuum theoretically.

However, Prof Ling is a strong believer of holism in education, and tries to impart values to students as well.

Emphasises Prof Ling: "I don't believe in just training of the academic aspect."

To meet this aim, CoS introduced the College's Distinguished Undergraduate Award in 2013. Every year, up to three awards are given to students who are not just strong academically, but have also demonstrated leadership and engagement with society.

As part of the criteria, students are required to propose a community project and execute it. In addition, half of the award money must be contributed to the same venture.

"I would regard a graduate successful so long as he or she is contributing meaningfully to the society, leading a happy existence, contented and confident enough to know that he or she is actually successful, not in comparison to others, but just where he or she stands," explains the Professor.

To Prof Ling, a successful CoS student has to have compassion, strength, passion, a mission and works hard towards goals.

"[A strong person] must have the moral strength to want to stand up for what he or she firmly believes in, and not just drift according to what the most fashionable beliefs are," he says.

CHALLENGES

Talent is in the heart of advancement and according to the Dean, most of the challenges the College encounters are related to that.

Firstly, the race to acquire top talent is a global one. CoS has to compete with universities all around the world to attract the best scientific minds.

"If you want to aspire to have an international renown in research, you need to be able to attract and anchor talents," says Prof Ling.

He explains that Singapore has a small pool of talents to draw from and it has only entered the fray of scientific research fairly recently. Therefore, there is a lack of established scientists here.

"It is an international competition; every respectable university is looking for talent," highlights Prof Ling.

However, while CoS wants to attract international talents to build up its reputation, it is also important to nurture Singaporeans to take up the mantle.

"It's very important to bring in talent from all over the world but it is also very important to develop a Singaporean core," says the Professor, adding that it would enable the country to fuel sustained growth and excellence. In addition, the College is also trying to pull back Singaporeans who are based overseas.

Keeping that in mind, he adds that at the end of the day, 'excellence and quality have to prevail and fit with the overall strategy' of engaging the best minds. Therefore, Singaporeans pulled into CoS are also subject to stringent criteria.

"Hopefully as time evolves, our existing young Singaporeans will mature and become leading scientists," says Prof Ling.

Thirdly, the Dean describes the college as 'bottom heavy' due to its youth. This means that majority of the faculty is still young and inexperienced.

"We really need to be patient and give them [the CoS faculty] time to mature, give them time to blossom. There's nothing much we can do to short circuit this process," he says.

Lastly, CoS has to battle local perception vis-à-vis global rankings. Whilst NTU has been steadily rising in regard internationally, that recognition has not followed home.

"Locally, I think the perception of local universities somehow lags behind what rankings show [and] what the international academic community perceives," says the Professor.

He adds that the challenge is to convince parents and students that universities in Singapore are as good as overseas choices.

FUTURE PLANS AND DEVELOPMENTS

As a testament to the boldness of its faculty in experimenting with new ideas, CoS has embarked on various projects.

NTU currently hosts two research centers of excellence – the Earth Observatory of Singapore and the Singapore Centre On Environmental Life Sciences Engineering. CoS has plans to set up another scientific gem.

Within the next year, the Asian School of the Environment would be established as the first batch of undergraduates enters NTU in August. In addition, a new major called Environmental Earth Systems Science has been introduced. It is a multidisciplinary subject, which looks at environment, ecology and earth science from both scientific and social points of view.

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Elaborating on the importance of such subjects, Prof Ling explains: “Once the School is set up, we will be able to put together a team of academics and students who are able to interact around the themes of the environment, ecology and earth sciences and these are pressing issues, big challenges.”

Similarly, a new programme called ‘Making and Tinkering’ was recently introduced in SPMS. It brought students together from different majors to work on an open-ended problem.

“We believe that modern day problem solving and modern day innovation requires such multidisciplinary approaches,” explains Prof Ling. In addition, courses like this would also prepare students for the workplace, where they would be required to work with people of diverse backgrounds and varying abilities.

The introduction of self-paced courses is also a fairly new undertaking. Materials for courses are made available both online and in books, and students progress at their own pace under the guidance of a faculty member or professor. As such, they are able to manage the speed according to their abilities.

MOVING FORWARD

Prof Ling has observed phenomenal growth over the past decade in the local sciences and mathematical industry, and there are tremendous opportunities in the field.

With such optimism, it is hard not to succeed. New technological innovations are the engines of mankind’s progress and the key to solving major challenges, but underpinning such technologies is science.

“If we think the past fifteen years have been exciting, I think the next fifteen years will be even more mind-boggling,” says Prof Ling.

MEET SOME OF COS’ STELLAR INTERNATIONAL FACULTY...

Professor Kerry Sieh

Director, Earth Observatory of Singapore
Division of Earth Sciences, SPMS

A prominent geologist, Prof Sieh is the Founding Director of the Earth Observatory of Singapore (EOS) which aims to conduct basic and applied research related to earthquake, tsunami, volcanic, and climate hazards. A member of the US National Academy of Sciences, one of the highest honours that can be accorded a US scientist or engineer, Prof Sieh initiated the field of paleoseismology some 30 years ago. This involves using geological layers and landforms to understand the geometries of active faults, the earthquakes they generate and the crustal structure their movements produce.

Professor Staffan Kjelleberg

Director, Singapore Centre on Environmental Life Sciences Engineering
Professor, SBS

Prof Kjelleberg takes a keen interest in a community of organisms known as biofilm. Study on biofilms and related research projects are conducted at the Singapore Centre on Environmental Life Sciences Engineering (SCELSE), headed by Prof Kjelleberg. SCELSE is harnessing the power of micro-organisms to solve critical water and environmental challenges. He plans to develop this research centre into a world leader on biofilm research, and to transfer knowledge to the industry so as to create a more sustainable earth.

Professor Paul Tapponnier

Tectonics Group Leader, Earth Observatory of Singapore
Division of Earth Sciences, SPMS

Recognised as the foremost scientist of his generation in the field of neotectonics, Prof Tapponnier heads the Tectonics Group at EOS. Spending more than three decades at Institut de Physique du Globe de Paris in France, he built France’s leading centre for tectonic science, Laboratoire Tectonique. Besides discovering the great active faults of Tibet, he also pioneered the use of satellite imagery in tectonics research.

Professor Daniela Rhodes

Professor, SBS

A professor at SBS with a joint appointment at the Lee Kong Chian School of Medicine, Prof Rhodes became internationally recognised for crystallising the nucleosome core (the central unit in DNA packaging), a major scientific breakthrough in 1976, and for her work on chromosome structure, telomeres, transcription factors and epigenetics. Crystallisation and structural analyses of telomerase require large amounts of enzyme that Prof Rhodes hopes to produce in NTU’s state-of-the-art Protein Production Platform, a facility under SBS.